

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

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Date of mailing
(day/month/year)

22.03.2005

Applicant's or agent's file reference

P931-PCT

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/JP2004/019284

International filing date (day/month/year)

16.12.2004

Priority date (day/month/year)

17.12.2003

International Patent Classification (IPC) or both national classification and IPC

Int.Cl. **H01L21/28, H01L33/00**

Applicant

SHOWA DENKO K.K.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Date of completion of this opinion

09.03.2005

Name and mailing address of the ISA/JP

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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2004/019284

Box No. I Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/JP2004/ 019284

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1 - 25</u>	YES
	Claims	_____	NO
Inventive step (IS)	Claims	_____	YES
	Claims	<u>1 - 25</u>	NO
Industrial applicability (IA)	Claims	<u>1 - 25</u>	YES
	Claims	_____	NO

2. Citations and explanations

The following documents cited in the international search report (ISR) have been considered for the purpose of this report.

D1= JP 2003-110140 A (Nichia Corporation) 2003.04.11, Paragraphs [0013], [0015], [0022], [0027], [0028], Figure 2 (Family: None)

D2= JP 2002-368271 A (Toyoda Gosei Co., Ltd.) 2002.12.20, Paragraphs [0011]-[0013], Figure 1 & EP 1406313 A1 & WO 2002/101841 A1

D3= JP 2003-224298 A (Nichia Corporation) 2003.08.08, Paragraphs [0010], [0023] (Family: None)

D4= JP 5-291621 A (Nichia Corporation) 1993.11.05, Paragraph [0009] (Family: None)

D5= US 2003/0194826 A1 (Toyoda Gosei Co., Ltd.) 2003.10.16, Paragraph [0040] & JP 2003-309285 A

Claims 1, 5-9, 14, 17, 19-25

The subject matters of claims 1, 5, 6, 7-9, 14, 17, 19-25 do not appear to involve an inventive step with respect to document D1. Since Cr or combination of some elements including Cr and Al as a material of negative alloy electrode of a GaN based compound semiconductor light-emitting device are shown in D1, it would be obvious for a person skilled in the art to determine a metallic elements to be included in the negative alloy electrode disclosed in D1 through experimentation as appropriate.

Claims 1, 5-8, 14-16, 23-25

The subject matters of claims 1, 5-8, 14-16, 23-25 do not appear to involve an inventive step with respect to document D2. Since Cr or combination of some elements including Cr and Al as a material of negative alloy electrode of a GaN based compound semiconductor light-emitting device are shown in D2, it would be obvious for a person skilled in the art to determine a metallic elements to be included in the negative alloy electrode disclosed in D2 through experimentation as appropriate.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

10/582913
International application No.
PCT/JP2004/019284

Supplemental Box

AP3 Rec'd PCT/PTO 14 JUN 2006

In case the space in any of the preceding boxes is not sufficient.
Continuation of: V. 2

Claims 2-4

The subject matters of claims 2-4 do not appear to involve an inventive step with respect to document D1 or D2. It would be obvious for a person skilled in the art to optimize the rate of content of the negative alloy electrode disclosed in D1 or D2 through experimentation as appropriate.

Claims 10-13

The subject matters of claims 10-13 do not appear to involve an inventive step with respect to document D1 or D2, and the general knowledge of a person skilled in the art. It would be obvious for a person skilled in the art to conceive the idea of applying the provision of solder to the invention disclosed in D1 or D2.

Claims 15, 16

The subject matters of claims 15 and 16 do not appear to involve an inventive step with respect to a combination of documents D1 and D2. D2 discloses an adhesion layer formed of Ti, Cr or V with thickness of 10nm. Therefore it would be obvious for a person skilled in the art to conceive the idea of applying the technical features employed in D2 to the invention disclosed in D1.

Claims 17-22

The subject matters of claims 17-22 do not appear to involve an inventive step with respect to a combination of documents D1 and D2. D1 discloses a barrier layer formed of W, Ti or Ni with thickness of 200nm. Therefore it would be obvious for a person skilled in the art to conceive the idea of applying the technical features employed in D1 to the invention disclosed in D2.

Claims 1-25

The subject matters of claims 1-25 do not appear to involve an inventive step with respect to a combination of documents D1-D5 and the general knowledge of a person skilled in the art. D3-D5 disclose a metal including Cr and Al, or an alloy of any two or more kinds of metals selected from these metals, or a multi-layer structure thereof to be used as a material of negative alloy electrode of a GaN based compound semiconductor light-emitting device. Therefore it would be obvious for a person skilled in the art to conceive the idea of applying the technical features employed in D3-D5 to the invention disclosed in D1 or D2.